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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/540,741

06/24/2005

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EXAMINER

GADDY, BENJAMIN E

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/540,741	Applicant(s) GRANCHAROV ET AL.	
	Examiner Benjamin E. Gaddy	Art Unit 4181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 and 26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21, 26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/24/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Adaptive post-filtering of speech signals to reduce coding noise."

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 26 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 26 is directed towards computer code, which does not fall into a recognized statutory category. Examples of acceptable preambles include: "a computer readable medium encoded with computer executable instructions" or "a computer readable medium having a stored computer program."

Claim 26 also attempts to claim a machine, but depends upon a claim to a method. This is not statutorily allowable. The method steps referenced in the claim 26 must be explicitly listed as limitations.

For the purposes of examination, it will be assumed that the applicant intended to claim a computer-readable article of manufacture embodying the claimed code.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 8-10, 15-17, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395).

Consider claims 1, 15, and 26 (and the above 101 rejection): Atal discloses a method of filtering a speech signal (**see Col. 9, lines 32-40, where Atal discusses an adaptive feedback filter for speech**), the method involving the steps of providing a filter suited for reduction of distortion caused by speech coding (**see Col. 9, lines 20-25, where Atal discusses a filter and Col. 9, lines 35-45, where Atal discusses reducing quantizing noise and prediction parameter signals**); predicting acoustic noise in said speech signal (**see Col. 9, lines 50-57, where Atal discusses the filter is weighted according to the formant prediction parameters**); adapting said filter in response to the predicted acoustic noise to obtain an adapted filter (**see Col. 9, lines 35-40, where Atal discusses the operation of the adaptive filter**); and applying said adapted filter to said speech signal so as to reduce acoustic noise and distortion caused by speech coding in said speech signal (**see Col. 9, lines 45-50, where Atal discusses the distortion due to noise is reduced**).

Atal does not specifically disclose estimating acoustic noise, however Arslan discloses estimating acoustic noise (**see Col. 6, lines 5-15, where Arslan discusses estimates for the noise in the speech spectrum**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal, and use estimating acoustic noise as

taught by Arslan, thus suppressing noise to prevent speech quality losses, as discussed by Arslan (**see Col. 2, lines 30-38**).

Consider claims 2 and 16: Atal discloses adapting a filter involves adjusting filter coefficients of said filter (**see Col. 10, lines 38-51, where Atal discusses the filter parameter signals, therefore the coefficients, are modified**).

Consider claims 3 and 17: Atal as modified by Arslan discloses steps of estimating, adapting and applying are performed for portions of said speech signal which contain speech as well as for portions which do not contain speech (**see Atal Col. 9, lines 45-50, where Atal discusses the distortion of speech due to noise is reduced; and Arslan Col. 9, lines 7-15, where Arslan discusses the filter applied during pauses between words**).

Consider claim 8: Atal discloses estimating, adapting and applying are performed after a step of decoding said speech signal (**see Col. 11, line 62- Col. 12, line 8**).

Consider claim 9: Atal discloses estimating, adapting and applying are performed before a step of encoding said speech signal (**see Fig. 1, and Col. 11, lines 50-64**).

Consider claims 10 and 21: Atal discloses a speech signal comprises speech frames and wherein said steps of estimating, adapting and applying are performed on a frame-by-frame basis (**see Col. 5, line 64 – Col. 6, line 9, where Atal discusses frames**).

4. Claims 4 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395) as applied to claims 1 and 15 above, and further in view of Crozier (US 5,742,927).

Consider claims 4 and 18: Atal as modified by Arslan discloses a short-term filter function designed for reducing noise between spectrum formant peaks of said speech signal and wherein said filter coefficients include at least one coefficient that controls the frequency response of said short-term filter function (**see Col. 9, lines 50-60, and Col. 10, lines 38-51, where Atal discusses the filter parameter signals**).

Atal does not specifically disclose attenuation between spectrum formant peaks, however Crozier discloses attenuation between spectrum formant peaks (**see Col. 4, lines 5-15, where Crozier discusses attenuation of regions between formants**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal, and use attenuation between spectrum formant peaks as taught by Crozier, thus avoiding noise-related problems such as impaired quality, as discussed by Crozier (**see Col. 1, lines 14-20**).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395) and Crozier (US 5,742,927) as applied to claim 4 above, and further in view of Sluijter (US 6,363,340).

Consider claim 5: Atal discloses a spectrum compensation function and wherein said filter coefficients include at least one coefficient that controls said spectrum compensation function (**see Col 10, lines 10-20, and Eqn. 18**).

Atal does not specifically disclose tilt compensation, however Sluijter discloses tilt compensation (**see Col. 12, lines 42-53, where Sluijter discusses adaptive tilt compensation**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal, and use tilt compensation as taught by Sluijter, thus

improving speech quality in the presence of noise, as discussed by Sluijter (**see Col. 1, lines 48-52**).

6. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395) as applied to claims 1 and 15 above, and further in view of Sluijter (US 6,363,340).

Consider claims 6 and 19: Atal discloses acoustic noise in said speech signal is estimated as relative noise energy (**see Col. 9, lines 45-50, where Atal discusses speech signal to quantizing noise ratio**) and noise spectrum (**see Col 10, lines 10-20, and Eqn. 18**).

Atal does not specifically disclose spectrum tilt, however Sluijter discloses spectrum tilt (**see Col. 12, lines 42-53, where Sluijter discusses adaptive tilt compensation**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal, and use spectrum tilt as taught by Sluijter, thus improving speech quality in the presence of noise, as discussed by Sluijter (**see Col. 1, lines 48-52**).

7. Claims 7, 11, 12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395) as applied to claims 2 and 16 above, and further in view of Kang (US 5,448,680).

Consider claims 7 and 20: Atal as modified by Arslan discloses adapting is performed by selecting values for said filter coefficients from a table which maps a plurality of values of estimated acoustic noise to a plurality of filter coefficient values (**see Col. 10, lines 52-60, where Atal discusses a filter coefficient generator and Arslan, Col. 6, lines 42-53, where Arslan discusses a codebook**).

Atal and Arslan do not specifically disclose a lookup table, however Kang discloses a lookup table (**see Col. 5, line 67 – Col. 6, line 16, where Kang discusses a lookup table**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal and Arslan, and use a lookup table as taught by Kang, thus providing increased tolerance to errors, as discussed by Kang (**see Col. 1, lines 24-38**).

Consider claim 11: Atal as modified by Arslan and Kang discloses the initial steps of generating said lookup table by: adding different artificial noise power spectra having given parameter (s) of acoustic noise to different clean speech power spectra; optimizing a predetermined distortion measure by applying said filter to different combinations of clean speech power spectra and artificial noise power spectra; and for said different combinations, saving in said lookup table those filter coefficient values, for which said predetermined distortion measure is optimal, together with corresponding value (s) of said given parameter (s) of acoustic noise (**see Kang, Col. 6, lines 10-60**).

Consider claim 12: Atal discloses Spectral Distortion (**see Col. 8, lines 30-64**).

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395) and Kang (US 5,448,680) as applied to claim 11 above, and further in view of Sluijter (US 6,363,340).

Consider claim 13: Atal discloses acoustic noise in said speech signal is estimated as relative noise energy (**see Col. 9, lines 45-50, where Atal discusses speech signal to quantizing noise ratio**) and noise spectrum (**see Col 10, lines 10-20, and Eqn. 18**).

Atal does not specifically disclose spectrum tilt, however Sluijter discloses spectrum tilt (**see Col. 12, lines 42-53, where Sluijter discusses adaptive tilt compensation**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal, and use spectrum tilt as taught by Sluijter, thus improving speech quality in the presence of noise, as discussed by Sluijter (**see Col. 1, lines 48-52**).

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atal (US 4,133,976) in view of Arslan (US 5,706,395) as applied to claim 10 above, and further in view of Sluijter (US 6,363,340).

Consider claim 14: Atal discloses acoustic noise in said speech signal is estimated as relative noise energy (**see Col. 9, lines 45-50, where Atal discusses speech signal to quantizing noise ratio**) and noise spectrum (**see Col 10, lines 10-20, and Eqn. 18**) the method comprising the further steps, after said step of estimating acoustic noise, of deciding whether the estimated relative noise energy for a current speech frame is below a predetermined threshold; and if so, not performing said steps of adapting filter coefficients and applying said filter, and instead performing energy attenuation on the current speech frame so as to suppress acoustic noise in a speech pause (**Arslan Col. 9, lines 50-67**).

Atal does not specifically disclose spectrum tilt, however Sluijter discloses spectrum tilt (**see Col. 12, lines 42-53, where Sluijter discusses adaptive tilt compensation**). It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Atal, and use spectrum tilt as taught by Sluijter, thus improving speech quality in the presence of noise, as discussed by Sluijter (**see Col. 1, lines 48-52**).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin E. Gaddy whose telephone number is (571) 270-5134. The examiner can normally be reached on M-TH 9am - 4pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nick Corsaro can be reached on (571) 272-7876. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Benjamin E. Gaddy

/Benjamin E Gaddy/

Examiner, Art Unit 4181

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Supervisory Patent Examiner, Art Unit 4181